

Seminar Boundary Layer Theory

Wintersemester 2024/25

Organizer: **P.D. Dr. Alden Waters**

The precise choice of topics depends on the background of the participants and will be decided in the first session. This seminar give the basis of boundary layer theory for Lipschitz domains. The subjects include the well-posedness of boundary value problems for Poisson problem and the Helmholtz problem. If time permits we will also do some thermal boundary layer theory. The idea is to understand the single and double layer potential operators as well as the single and double boundary layer operators and their relationship to the Dirichlet-to-Neumann and Neumann-to Dirichlet maps. Invertibility and regularity of the operators will be examined, as well as the jump relationships and Fredholm properties

Preliminary requirements: Students who have taken Analysis 1, 2 are invited to join. The course "partial differential equations" is highly recommended as a prerequisite.

Literature:

Taylor, M.E. : Partial differential equations II. Qualitative studies of linear equations, volume 116 of Applied Mathematical Sciences. Springer, New York, second edition, 2011

McLean, W.: Strongly elliptic systems and boundary integral equations. Cambridge University Press, Cambridge, 2000.

Costabel, M.: Boundary integral operators on Lipschitz domains: elementary results. SIAM J. Math. Anal. 19, 613–626 (1988)

Mitrea, M.: Boundary value problems and Hardy spaces associated to the Helmholtz equation in Lipschitz domains. J. Math. Anal. Appl. 202(3), 819–842 (1996)

Verchota, G.: Layer Potentials and Boundary Value Problems for Laplace's Equations on Lipschitz Domains. Ph.D. Thesis, University of Minnesota (1982)

Participants will work out a topic, give a presentation, and prepare a short write-up.

Registration: in addition to registration please write a short e-mail to alden.waters@math.uni-hannover.de indicating your background and, if applicable, if you have a particular topic that interests you.

First meeting is on Oct 16 2024. Communication via studip.